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Stern et al.

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[54] **SPRAY TEXTURING NOZZLES HAVING VARIABLE ORIFICE**

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[73] Assignee: **DJS&T Limited Partnership**, Bellingham, Wash.

[*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,310,095.

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[22] Filed: **Oct. 12, 1994**

Related U.S. Application Data

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[63] Continuation-in-part of Ser. No. 238,471, Jun. 6, 1994, Pat. No. 5,409,148, which is a continuation of Ser. No. 216,155, Mar. 22, 1994, abandoned, which is a continuation of Ser. No. 840,795, Feb. 24, 1992, Pat. No. 5,310,095.

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[51] Int. Cl.⁶ **B65D 83/14**

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[52] U.S. Cl. **222/402.1; 239/393; 239/394**

[58] Field of Search 222/402.17, 402.1, 222/394; 239/337, 1, 390, 391, 393, 394, 346, 345, 348

[57] ABSTRACT

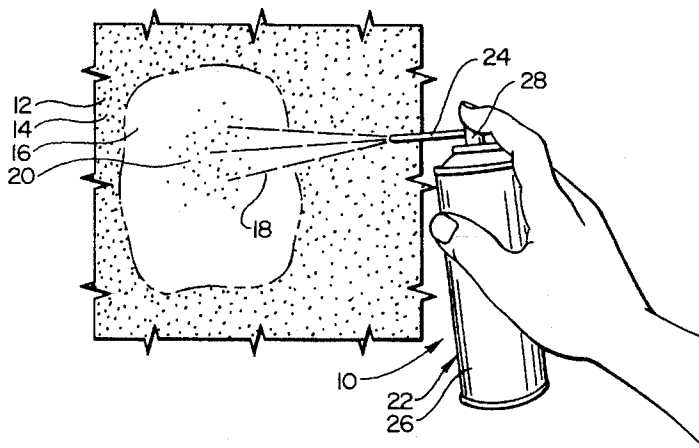
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An apparatus for applying spray texture to a wall or the like. The apparatus comprises an aerosol can containing pressurized spray texture material. The spray texture material is released from the can by a valve and passes through a nozzle passageway, out of a discharge opening, and on to a surface to be textured. The apparatus further comprises an outlet member that can be placed over the discharge opening to vary the effective cross-sectional area thereof. This outlet member can be in the form of a straw or tube that is inserted into the nozzle passageway or a disc or other member having a plurality of outlet orifices formed therein. The outlet member having a plurality of outlet orifices can be attached directly to an actuator member in which the dispensing passageway is formed. By rotating, sliding, or otherwise moving the outlet member relative to the actuator member, any one of the outlet orifices in the outlet member can be arranged at the end of the nozzle passageway to vary the effective cross-sectional area of the discharge opening.

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14 Claims, 8 Drawing Sheets



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FIG. 1

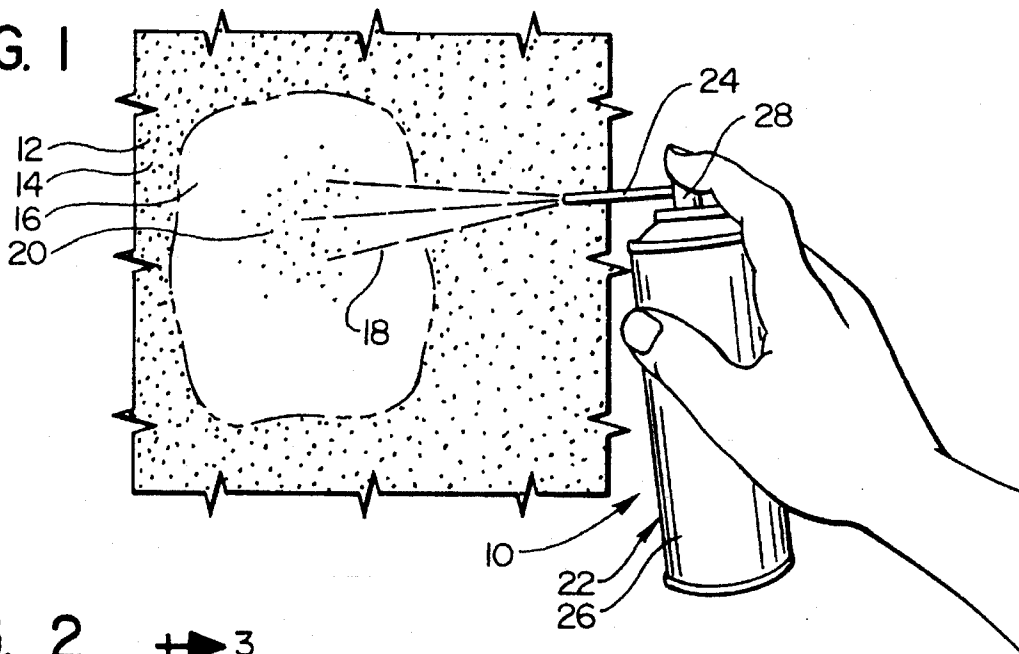


FIG. 2

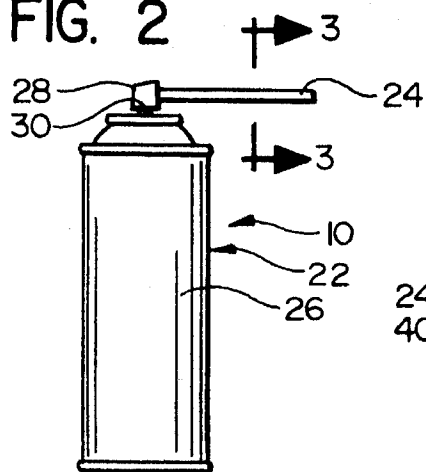


FIG. 3



FIG. 4

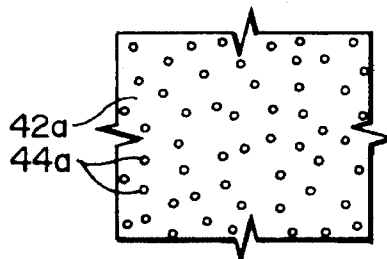


FIG. 5

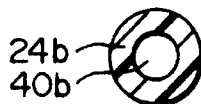


FIG. 6

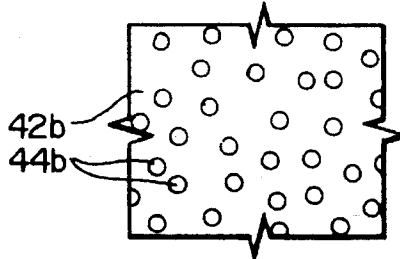


FIG. 7



FIG. 8

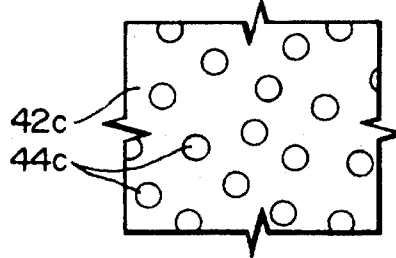


FIG. 9



FIG. 10

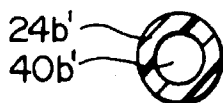


FIG. 11

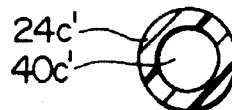


FIG. 12

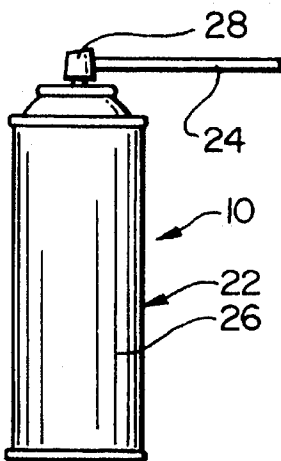


FIG. 13

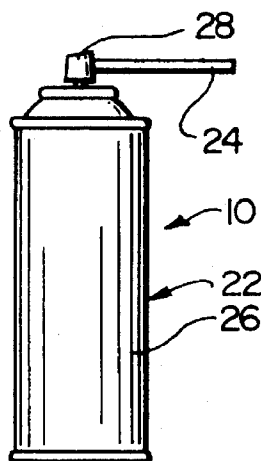


FIG. 14

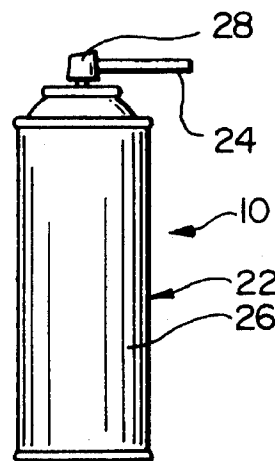


FIG. 15

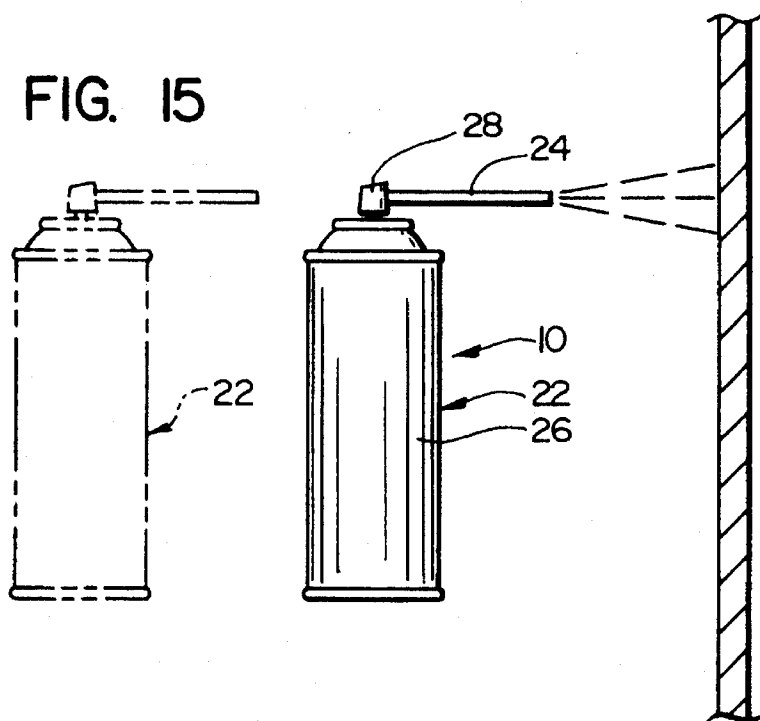


FIG. 16

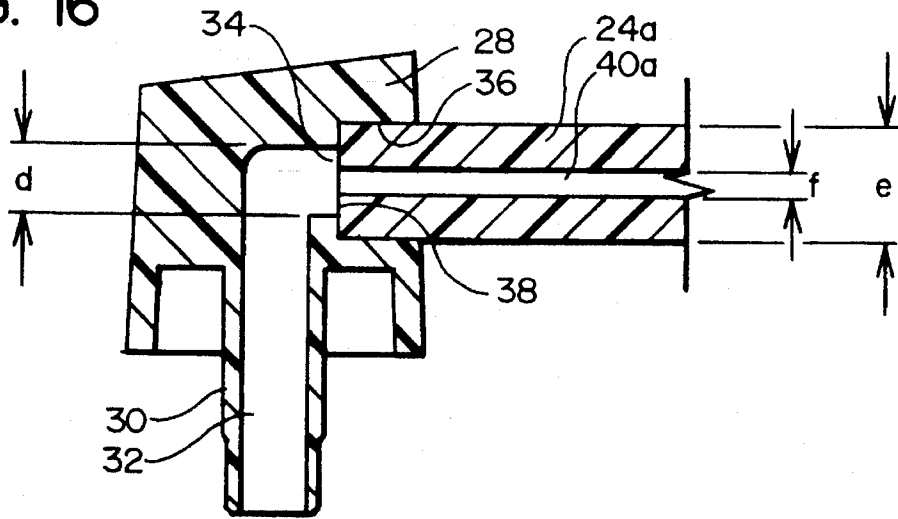


FIG. 17

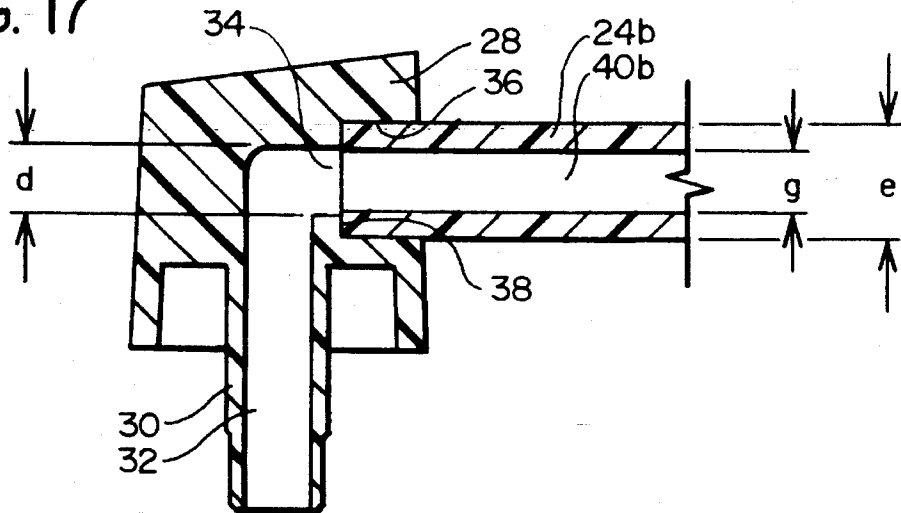


FIG. 18

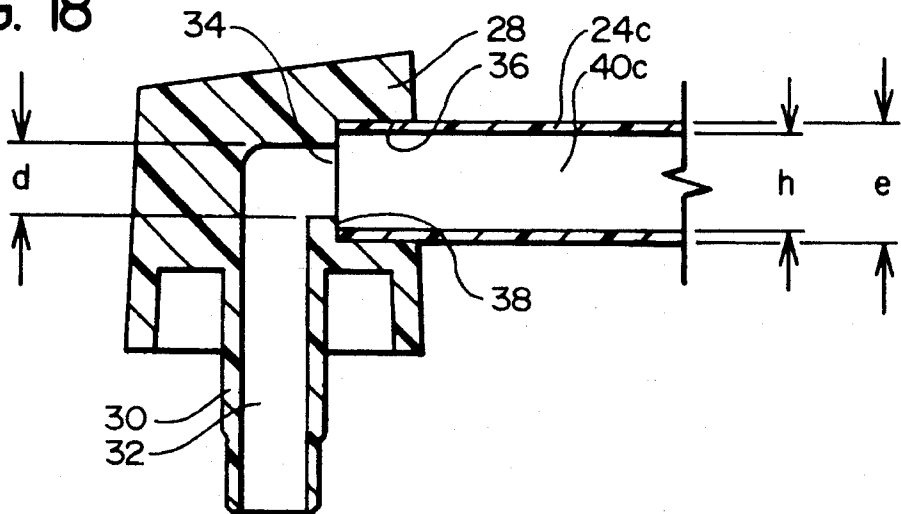


FIG. 20

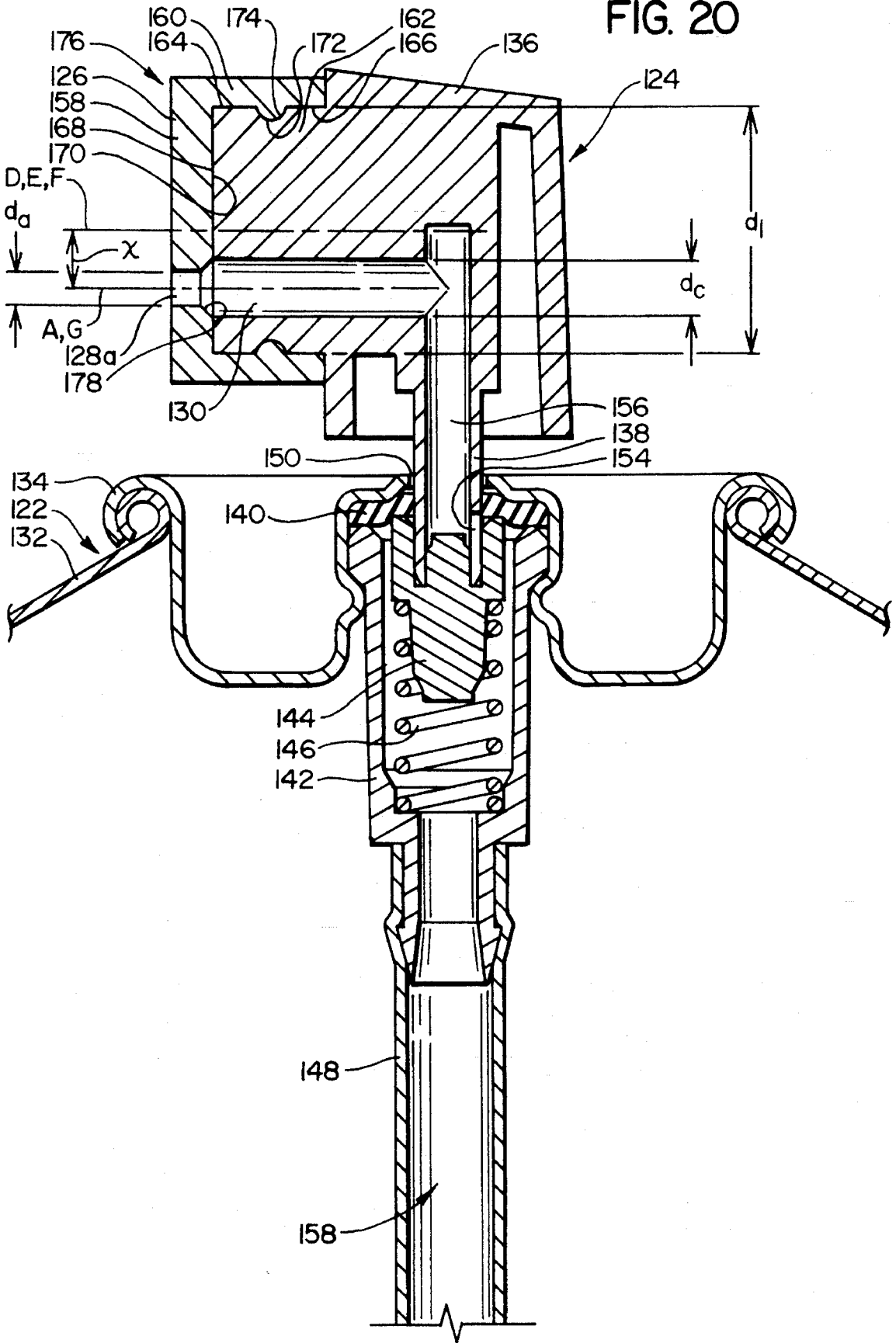


FIG. 21

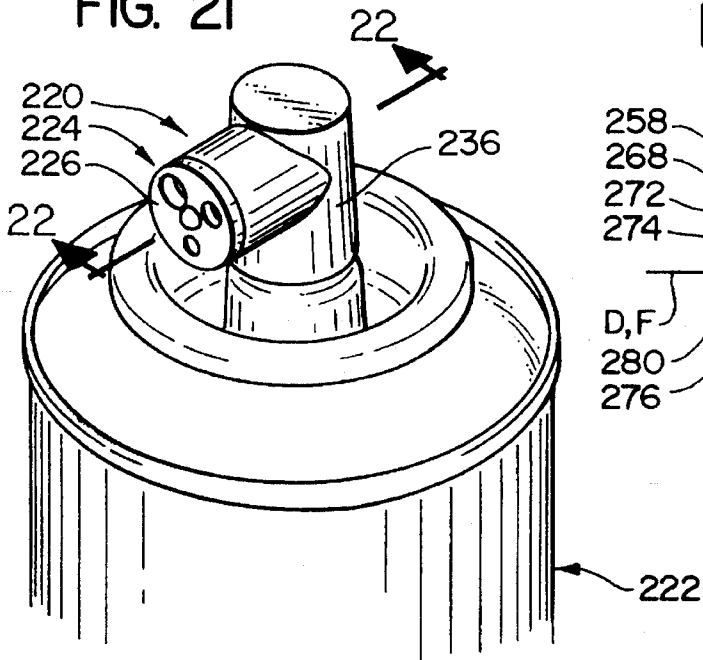


FIG. 22

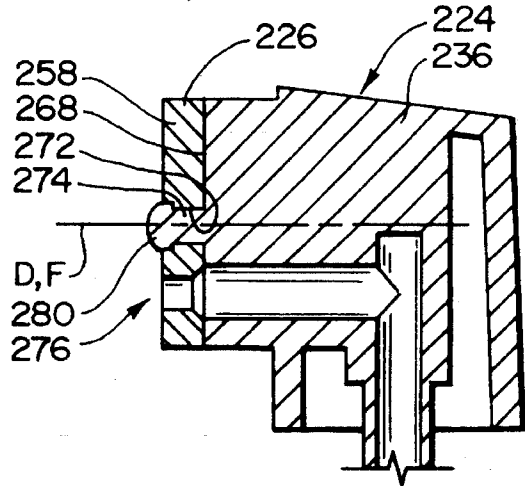


FIG. 23

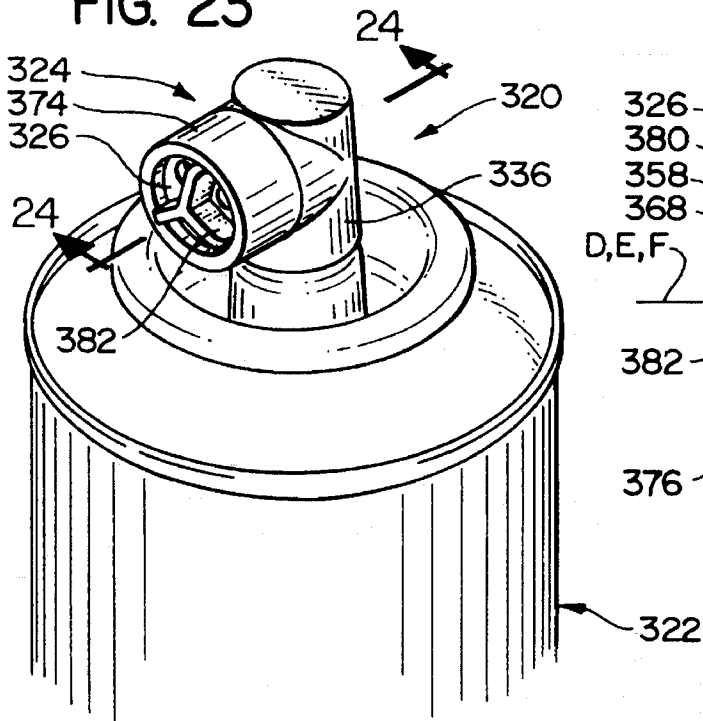


FIG. 24

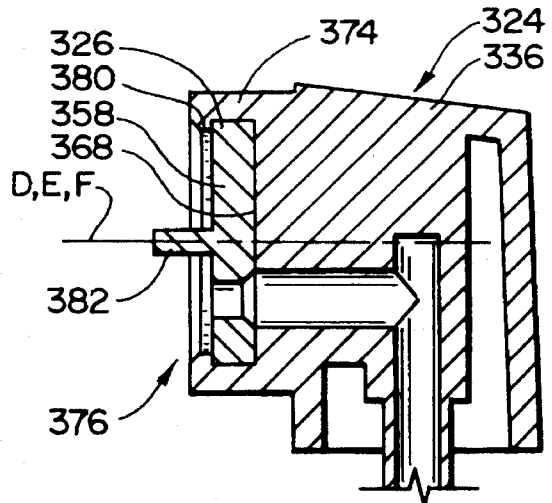


FIG. 25

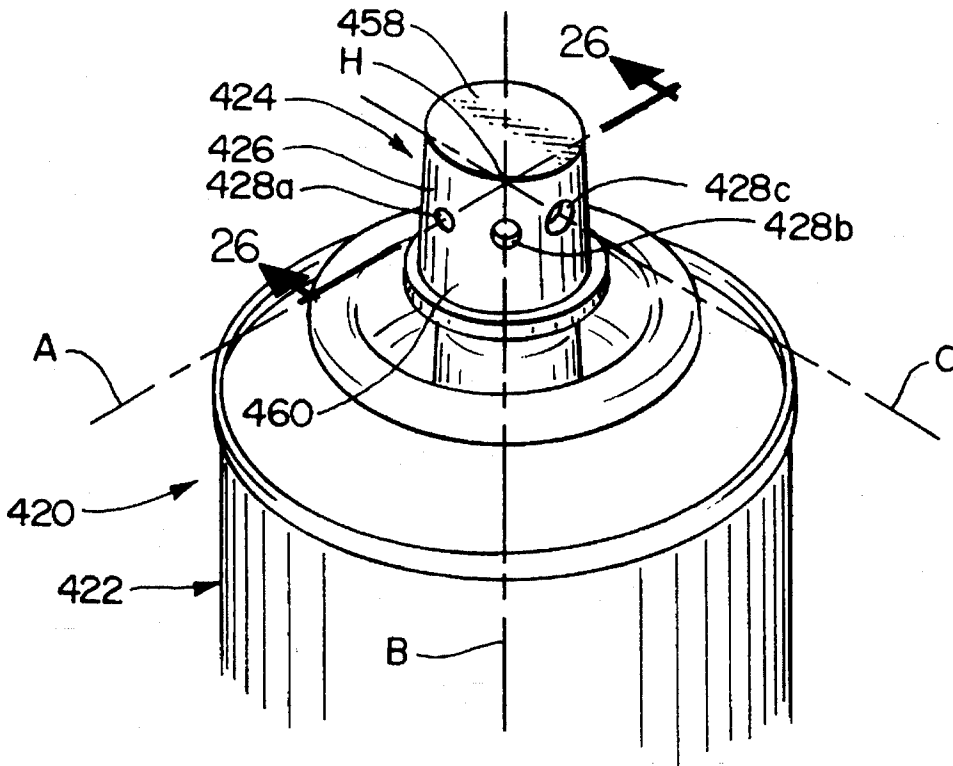
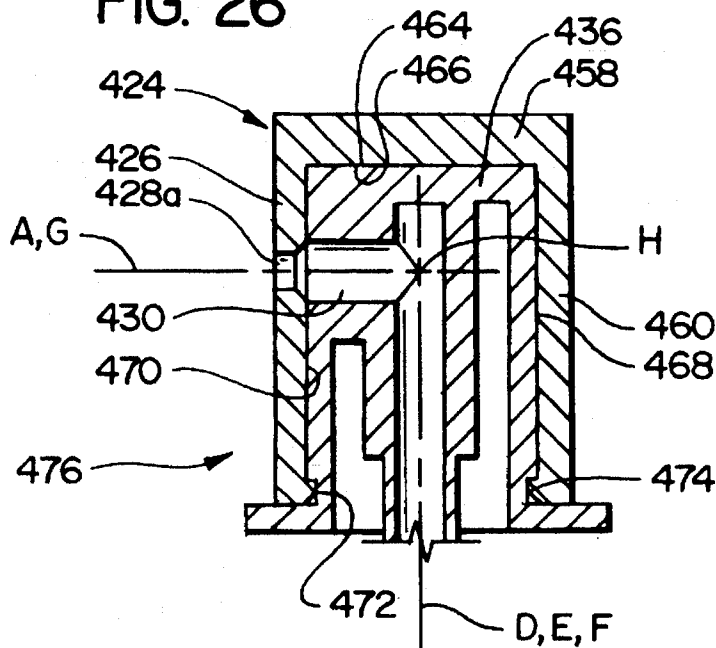
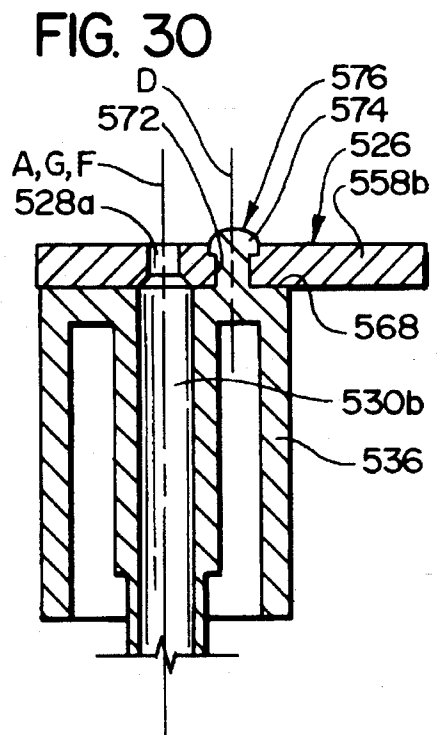
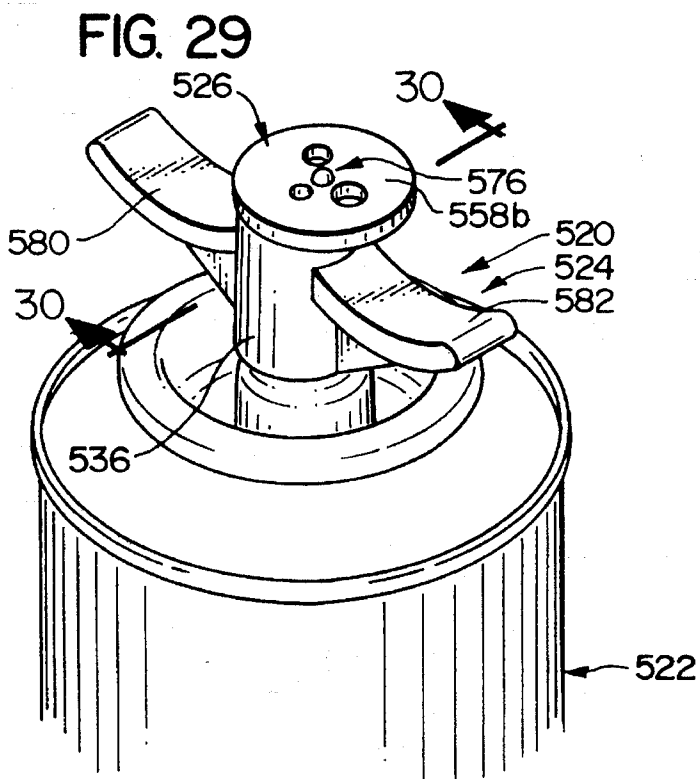
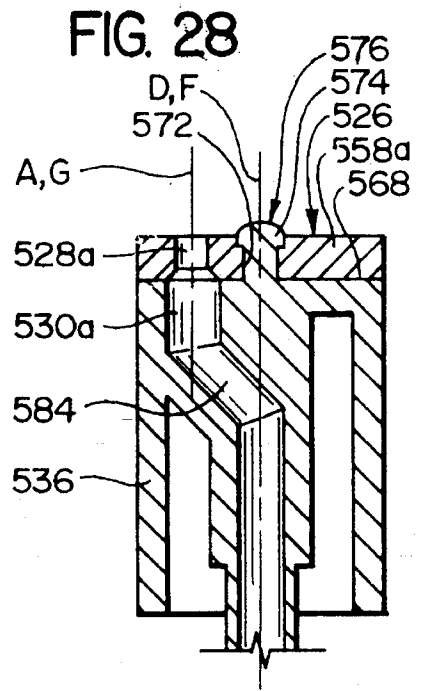
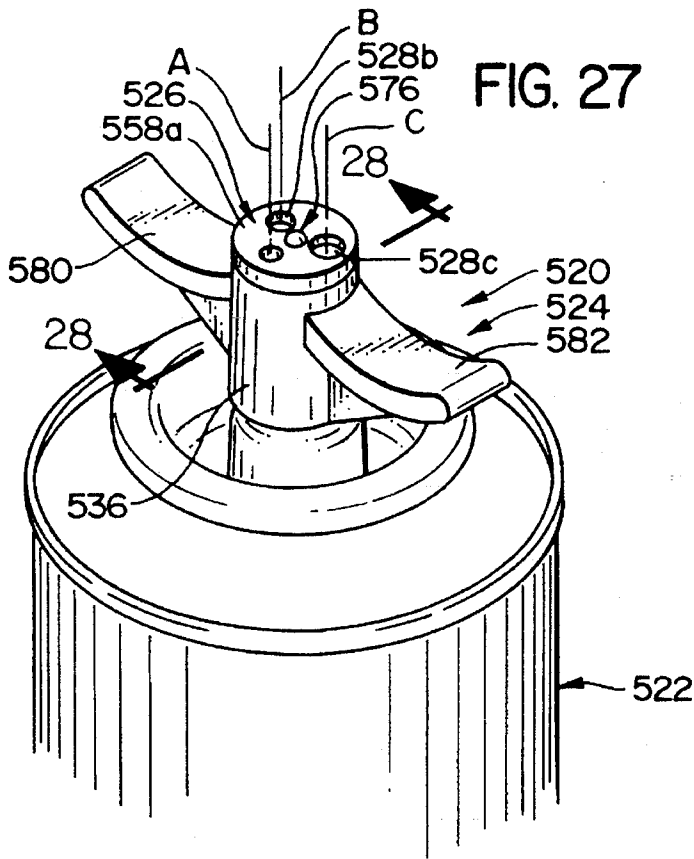


FIG. 26





SPRAY TEXTURING NOZZLES HAVING VARIABLE ORIFICE

RELATED APPLICATIONS

This is a continuation-in-part of Ser. No. 08/238,471, filed Jun. 6, 1994, now U.S. Pat. No. 5,409,148, which is a continuation of Ser. No. 08/216,155 filed Mar. 22, 1994, abandoned, which is a continuation of Ser. No. 840,795, filed Feb. 24, 1992, now U.S. Pat. No. 5,310,095.

TECHNICAL FIELD

The present invention relates to the art of spray texturing, and more particularly to an apparatus and method by which spray texturing can be accomplished to provide spray patterns of varying texture (i.e. with either finer or more coarse particle size).

BACKGROUND OF THE INVENTION

When drywall panels are installed in a building, and the seams taped, prior to painting the wall surface, there is often applied a spray texture, which is followed by painting. The spray texture will provide a desirable background pattern, and also obscure some of the seams that might appear in the drywall surface.

There are in the prior art various spray texturing tools or devices which utilize pressurized air to spray the texture material onto the wall surface. Some of these use compressed air as the gaseous medium to spray the textured material, with the pressurized air being derived from a remote source that feeds the air through a hose to the tool. There are also tools which are totally handheld, with the pressurized air being produced by manually reciprocating the piston of an airpump that is built into the tool.

When an existing drywall surface is being repaired, quite often a small section of drywall will be removed and another piece of drywall put in its place. The seams of this piece of drywall must then be taped, and (if the surrounding surface is textured) then have a texture surface treatment that would make it match with the surrounding drywall surface. It is, of course, desirable to have the spray pattern on the patch match that of the surrounding surface.

Also, when a rather small "patch" of drywall is to be spray textured, there is the matter of convenience. One approach has been simply to provide the spray texture material in an aerosol can, and the textured material is dispensed directly from the can to be sprayed onto the drywall surface. However, one of the considerations is how this can be accomplished in a manner to provide proper matching of the texture with that which is on the surrounding drywall.

U.S. Pat. No. 5,037,011 (Woods) discloses such an aerosol texture spraying device where the spray texture material is dispensed directly from the nozzle of the aerosol can. In a commercial embodiment of a device such as this, when there is higher pressure in the container, there is a relatively fine spray pattern. For a more coarse pattern (i.e. with larger particle sizes), the can is inverted and the nozzle depressed to dispense a certain amount of the propellant gas for a few seconds. Then the can is turned upright and the spray texture material dispensed at a lower pressure to provide the spray pattern with larger particle sizes.

U.S. Pat. No. 5,310,095 issued to the present Applicant discloses an apparatus for discharging a spray texture material through a nozzle means having a nozzle discharge opening to dispense this material. There is further provided

a first delivery tube means having a first discharge passageway of a first predetermined cross-sectional area. The material discharge apparatus is operated to cause the textured material to be discharged through the tube means. Then a second discharge tube means is positioned to receive material from the discharge nozzle means, and this second tube means has a second discharge passageway with a second predetermined cross-sectional area different from the first cross-sectional area. Thus, the '095 patent disclosed obtaining a finer spray pattern by utilizing a tube means with a passageway having a lesser cross-sectional area and a coarse pattern by discharging said material through the tube means having a greater cross-sectional area.

A primary problem with the method disclosed in the '095 patent is that a plurality of parts must be manufactured, shipped, sold, assembled and stored by the end user in order to maintain the capability of the product to create different texture patterns.

With the '095 patent, three straws must be sold in connection with the aerosol can. While this method is quite inexpensive from a manufacturing point of view, the shipping and sale of the product are somewhat complicated by the need to attach the three straws to the aerosol can. Further, the end user must install the straws into the actuating member of the aerosol can; this is difficult to accomplish without depressing the actuating member and discharging some of the texture material. Also, after the product disclosed in the '095 patent is used, the user must store the straws such that they are easily available when needed.

Accordingly, the need exists for a spray texturing device that is easy to use, inexpensive to manufacture, does not require user assembly, and does not require the shipment and storage of a plurality of parts.

OBJECTS OF THE INVENTION

From the foregoing, it should be apparent that one object of the present invention is to provide an improved apparatus for applying spray texture material to a patch in a wall or the like.

Another object of the present invention is to provide a spray texturing apparatus having a favorable balance of the following characteristics:

- a. inexpensively manufactured;
- b. does not require manufacture, shipment, sale, and storage of an excessive number of separate components; and
- c. obviates the need for the end user to assemble several parts together.

SUMMARY OF THE INVENTION

The present invention basically comprises an apparatus for allowing an operator to apply a texture to a surface, comprising: (a) a container for containing pressurized texture material; (b) a nozzle passageway; (c) a valve assembly for allowing the operator to create a path by which texture material may flow from the container into the dispensing passageway; and (d) an outlet member having a plurality of outlet orifices formed therein.

The nozzle passageway is arranged adjacent to the dispensing passageway to allow the operator to align one of the outlet orifices with the nozzle passageway. This allows the user to select the cross-sectional area of the discharge opening through which the texture material is discharged onto the surface. The texture pattern formed by the texture

material on the surface corresponds to the cross-sectional area of the outlet orifice selected by the operator.

The nozzle passageway is formed in an actuator member that forms at least a part of the valve assembly. The outlet member is a disc-shaped member or a cylindrical member having one closed end that is attached directly to the actuator member during manufacture. The outlet member as described herein obviates the need to provide a plurality of parts to change the cross-sectional area of the opening through which the spray texture material is discharged. The end user thus need not assemble parts together prior to use. Further, because it is attached directly to the actuator member, the outlet member will not be lost during shipment, display, use, or storage.

Further objects and advantages of the present invention will become apparent from the following detailed description.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an isometric view illustrating a preferred embodiment of the present invention applying a spray texture material to a patch on a drywall surface;

FIG. 2 is a side elevational view of the apparatus of the present invention;

FIG. 3 is a sectional view taken along 3—3 of FIG. 2, this being done to illustrate the inside diameter of the discharge tube which is made relatively small to provide a spray texture pattern of a more fine particle size;

FIG. 4 illustrates somewhat schematically a spray texture pattern in a wall surface which has relative fine particle size.

FIGS. 5 and 6 are views similar to FIGS. 3 and 4, with FIG. 5 showing a discharge passageway of a larger inside diameter, and FIG. 6 showing the spray pattern with a larger particle size;

FIGS. 7 and 8 are similar to FIGS. 3 and 4, respectively, with FIG. 7 showing the cross section of a discharge tube of yet larger inside diameter for the flow passageway, and FIG. 8 showing the spray pattern with a yet larger particle size;

FIGS. 9, 10 and 11 correspond to, respectively, FIGS. 3, 5 and 7 and show a different arrangement of discharge tubes where the outside diameter varies;

FIGS. 12, 13 and 14 illustrate the apparatus having tubes 24 of different lengths;

FIG. 15 is a side elevational view of the apparatus as shown being positioned closer to or further from a wall surface.

FIG. 16 is a cross sectional view taken through the dispensing head of the aerosol container, with this plane being coincident with the lengthwise axis of the dispensing tube and the vertical axis of the dispensing head, showing only the discharge orifice portion of the dispensing head, and further with the smaller inside diameter tube shown in FIG. 3;

FIG. 17 is a view similar to FIG. 16, but showing the dispensing head having the medium inside diameter tube of FIG. 5 positioned therein;

FIG. 18 is a view similar to FIGS. 16 and 17, but showing the dispensing tube of FIG. 7 having the largest inside diameter, as shown in FIG. 7;

FIG. 19 is a perspective view of another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention;

FIG. 20 is a partial cut-away view taken along lines 20—20 in FIG. 19;

FIG. 21 is a perspective view of another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention;

FIG. 22 is a partial cut-away view taken along lines 22—22 in FIG. 21;

FIG. 23 is a perspective view of another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention;

FIG. 24 is a partial cut-away view taken along lines 24—24 in FIG. 23;

FIG. 25 is a perspective view of another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention;

FIG. 26 is a partial cut-away view taken along lines 26—26 in FIG. 25;

FIG. 27 is a perspective view of another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention;

FIG. 28 is a partial cut-away view taken along lines 28—28 in FIG. 27;

FIG. 29 is a perspective view of another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention; and

FIG. 30 is a partial cut-away view taken along lines 30—30 in FIG. 29.

DETAILED DESCRIPTION

In FIG. 1, there is shown the apparatus 10 of the present invention being used in spraying the texture material onto a section of wallboard 12 having a previously sprayed surface portion 14 surrounding an unsprayed portion 16 which could be, for example, a more recently applied piece of wallboard that serves as a "patch". The spray itself is indicated at 18, and the spray material deposited on the wall portion 16 as a sprayed texture is indicated at 20.

With reference to FIG. 2, the present invention is shown being incorporated with an aerosol spray containing device 22, the basic design of which is or may be conventional in the prior art. Used in combination with this container 22 is a dispensing tube 24 which is a critical feature of the present invention. More particularly, it has been found by utilizing this dispensing tube 24 in particular arrangements to discharge the spray texture material, more precise control of the spray texture pattern can be achieved. Further, there are other advantages, in that not only is a more controllable spray pattern achieved, but this consistency of the spray pattern can be accomplished for a relatively long period of use. In other words, even after a substantial amount of the spray texture material has been already discharged from the aerosol dispensing container 22, the spray pattern remains rather consistent. The manner in which this is achieved will be described more fully later herein.

It is recognized that in the prior art tubular members have been used in combination with an aerosol spray can to deliver a material, such as a lubricant. To the best knowledge of the applicants, however, this use has been primarily to enable the aerosol container to deliver the fluid, such as a lubricating oil, to a somewhat inaccessible location, and not to achieve the ends of the present invention.

To return to our description of the aerosol dispensing device 22, as indicated above, the basic design is or may be conventional. As shown herein, the device 22 comprises a cylindrical container 26 and a dispensing nozzle member 28 positioned at the top of the container 26. As is common in

the prior art, this dispensing member 28 in its upright position blocks flow of material from the container 26. This dispensing member 28 is attached to a downwardly extending stem 30, and when the member 28 is depressed, a valve opens within the container 22 so that the material in the container 22 flows upwardly through the stem 30 and laterally out a nozzle formed in the dispensing nozzle member 28. Since the manner in which this is achieved is well known in the prior art, this will not be described in detail herein.

Reference is now made to FIGS. 16 through 18, and it can be seen that the stem 30 provides a passageway 32 through which the spray texture material flows upwardly, and then is directed laterally to be discharged through a lateral nozzle opening 34. The passageway 32 and nozzle 34 can have their dimensions and configuration optimized for proper performance, and the manner in which this is done is also known in the prior art.

In the present invention, the nozzle member 28 is provided with a counterbore 36 having a moderately enlarged diameter, relative to the diameter of the nozzle opening 34. Both the nozzle opening 34 and the counterbore 36 have a cylindrical configuration. The dispensing tube 24 has an outside diameter so that its end portion is able to fit snugly within the counterbore 36, with the end surface of the tube 34 bearing against the forwardly facing annular shoulder 38 defined by the counterbore 36 with the nozzle opening 34.

In the preferred embodiment of the present invention, a plurality of dispensing tubes 24 are provided, and in the present embodiment, there are three such tubes, 24a, 24b and 24c. It can be seen from examining FIGS. 3, 5 and 7 (and also FIGS. 16, 17 and 18) that the outside diameter of all three tubes 24a, 24b, and 24c have the same outside diameter, but different inside diameters for the discharge passageway 40.

It has been found that by selecting different diameters for the discharge passageway 40, the spray texture pattern can be controlled more accurately. With the smaller diameter 40a of the discharge tube 24a, shown in FIG. 3, a relatively fine spray texture pattern can be achieved, as shown in FIG. 4, where the particles of spray texture material are of a small particle size, as shown in the wall section 42a.

In FIG. 5, the interior discharge passageway 40b is of a more intermediate size, and this results in a discharge pattern which has a somewhat larger particle size, as shown in the wall section 42b. Then, with the yet larger diameter discharge opening 40c, as can be seen in FIG. 8, the wall section 42c having a spray texture pattern with a yet larger particle size. The particles of the board section 42a, 42b, and 42c are designated as, respectively, 44a, 44b and 44c.

With regard to the spray texture material itself, it has been found that quite desirable results can be achieved where the basic composition of the spray texture material comprises a resin or resins, particulate filler material and a propellant. Also, there is a solvent, and desirably dryers to accelerate the drying reaction of the resin with oxygen.

More specifically, the resin or resins desirably comprise alkyd resins, and more specifically those which are generally called bodying alkyds or puffing alkyds. Such alkyds are sometimes used for what are called "architectural coatings". The resins are made somewhat more gelatinous than would be used in other applications, this depending upon the spray characteristics that are desired. If the alkyd resins are made more gelatinous or viscous, a coarser spray pattern would be expected for a particular set of conditions.

The particulate filler material desirably has various particle sizes, and this can be a filler material or materials which

are well known in the prior art, such as calcium carbonate, silica, talc, wollastonite, various types of pigments, etc.

The propellant is desirably a liquefied hydrocarbon gas, with this liquefied gas being dispersed throughout the texture material composition, such as being dissolved therein or otherwise dispersed therein. The propellant is characterized that under the higher pressure within the container the propellant remains dispersed or dissolved as a liquid throughout the spray texture material, and upon release of pressure, the propellant begins going back to its gaseous form to act as a propellant and push the material up the stem passageway 32 and out the nozzle opening 34.

The solvent is desirably aromatic and/or aliphatic hydrocarbons, ketons, etc.

The dryer or dryers would normally be metallic dryer, such as various metal salts. These are already well known in the art, so these will not be described in detail herein.

It has been found that this type of texture material can be sprayed by using the present invention to provide a reasonably consistent spray texture for a given configuration of the tube 24. Also, it has been found that this consistency of spray pattern can be accomplished throughout the discharge of the great majority of the spray texture material within the container 26.

With regard to the particular dimensions utilized in this preferred embodiment of the present invention, reference is made to FIGS. 16 through 18. The diameter "d" of the nozzle orifice 34 is in this particular embodiment 0.102 inch, and the diameter of the counterbore (indicated at "e") is 0.172 inch; the diameter "f" of the passageway 40a (i.e. the smallest diameter passageway) is 0.050 inch; the diameter "g" of the intermediate sized passageway 40b (see FIG. 17) is 0.095 inch; and the diameter "h" of the largest tube passageway 40c is 0.145 inch.

Thus, it can be seen in the arrangements of FIGS. 16 through 18 that in FIG. 16, there is a substantial reduction in the cross-sectional area of the passageway 40a, with this having about one half the diameter of the nozzle opening 34, so that the passageway area 40a is about one quarter of the nozzle opening 34.

In the intermediate size of FIG. 17, the diameter and cross-sectional area of the passageway 40b (indicated at "g") is nearly the same as that of the nozzle 34.

In FIG. 18, the diameter of the passageway 40c (indicated at "h") is slightly less than one and one half of the nozzle opening 34, and the cross sectional area is about twice as large.

FIGS. 9, 10 and 11 show an alternative form of the tubes 24a-c, and these tubes in FIG. 9 through 11 (designated 24a', 24b' and 24c') have the same internal passageway cross-sectional area as the passageways 24a, 24b and 24c, respectively, but the outside diameter of these are made smaller, relative to the passageway size. If there is such varying outside diameters, then a plurality of mounting collars could be used, with these having consistent outside diameters, but varying inside diameters to fit around at least the smaller tubes of FIGS. 9 and 10.

FIGS. 12 through 14 are simply shown to illustrate that the length of the tube 24 can be varied. It has been found that a rather desirable length of the tube 24 is approximately four inches. While a longer tube length could be used, in general there is no particular advantage in doing so since the proper consistency can be obtained with a tube of about four inches. Also, experiments have indicated that the length of the tube 24 can be reduced lower than four inches, possibly to two

inches and even as low as one inch) without causing any substantial deterioration of the consistency and quality of the formation of the spray pattern. However, it has been found that somewhat more consistent results can be obtained if the length of the tube 24 is greater than one inch and at least as great or greater than two inches.

A tube length as short as one half inch has been tried, and this is able to provide a substantial improvement of performance over what would have been obtained simply by discharging the spray texture directly from the nozzle opening 34, without any tube, relative to controlling spray pattern. The shorter tube 24 (as small as one half inch) provides a significant benefit, but not the full benefit of the longer tube 24. The very short tube (e.g. one half inch) has a lesser quality of performance when used with the larger diameter passageway 40 than with the smaller passageway.

FIG. 15 illustrates that the texture pattern can also be controlled to some extent by moving the apparatus 10 closer to or farther away from the wall surface. If the apparatus 10 is moved rather close to the wall surface, the density of the applied material is increased for a given time of exposure. It has been found that in general satisfactory results can be obtained if the apparatus 10 is held approximately three feet from the wall surface. However, this will depend upon a number of factors, such as the pressure provided by the propellant, the character of the spray texture material, and other factors.

To describe now the operation of the present invention, an aerosol dispensing device 22 is provided as described previously herein with the spray texture material contained within the can 26 at a desired pressure. As is common with aerosol cans, it is desirable to shake the device 22 for a few seconds prior to depressing the nozzle control member 28.

If a relatively fine texture is desired, then a smaller diameter tube such as at 24a is used. For spray texture patterns having larger particle size, the larger diameter tube is used.

The person directs the nozzle opening 34 and the tube 24 toward the wall surface to be sprayed and depresses the nozzle member 28. As the spray texture material is discharged, the container 26 is moved back and forth and is tilted to different angles to spray the desired area.

As indicated earlier, it has been found that not only can a "fineness" or "coarseness" (i.e. smaller particle size or larger particle size, respectively) be controlled with reasonable precision by the present invention, but this consistency of the spraying pattern can be maintained throughout the discharge of the great majority of the spray material within the container 26. While these phenomena are not totally understood, it is believed that the following can be reasonably hypothesized to provide at least a partial explanation.

First, the separation of the texture material into particles of smaller or larger size is due in part to the character of the material itself, and also due in part to the way the forces are exerted on the material to tend to break it up into particles. More particularly, it can be hypothesized that if there is a greater shear force tending to separate the particles, it would be expected that there would be a finer pattern.

It is also recognized that when a fluid is moving through a conduit or tube, there is commonly what is called a velocity gradient along a transverse cross section of the flow of material. More precisely, the material immediately adjacent to the wall surface may have a very low velocity or practically no velocity. The adjacent material just a small distance away from the wall will have a somewhat greater velocity, but will still be retarded significantly due to the

shear force provided by the material that is closer to the wall surface. As the cross section of the liquid material is analyzed closer toward the center, the shear force becomes less and the velocity becomes more uniform.

With the foregoing in mind, it also has to be recognized that if the diameter of the tube or conduit is reduced by one half, the cross-sectional area is reduced by one quarter. Thus, for the smaller tube (i.e. one half diameter) the surface area that provides a retarding force is doubled relative to the volume of flow at the same velocity). This would indicate that for a given cross-sectional segment of the fluid material being discharged, there is relatively greater shear force exerted for the smaller inside diameter tube. This would lead to the conclusion that for the discharge of a given amount of fluid at a certain velocity and at the same pressure, there would be a smaller particle size than if a tube of greater inside diameter were used.

Another phenomenon to be considered is with regard to the pressure which is forcing the textured material out of the tube 24. It can be surmised that if the pressure is greater, the velocity of the material traveling through the tube 24 would be greater, so that the shear forces exerted on the texture material would be greater so that smaller particle sizes would result.

It can be seen in FIG. 16 that the relatively small diameter passageway 40a serves as a restriction for the material flowing out the nozzle 34. This would tend to cause the velocity of the material flowing up the stem passageway 32 and out the nozzle opening 34 to decrease to some extent, but to have a relatively higher velocity out the passageway 40a. Further, it can be expected that the pressure of the propelling gas in the passageway 40a would be somewhat higher than if a larger diameter passageway such as 40b or 40c were utilized. Experimental results using different size tubes seem to verify this conclusion.

In FIG. 17, the diameter and cross-sectional area of the passageway 40b is nearly the same as that of the nozzle opening 34. Therefore it can be surmised that the velocity and pressure in the passageway 40b would be somewhat less than in the passageway 40a, this resulting in a somewhat larger particle size, and also a somewhat lower discharge velocity. Experimental results have verified this also.

Finally, with reference to FIG. 18, when the passageway diameter is larger than that of the nozzle opening 34 (as it is with the passageway 40c), it can be expected that the fluid discharged from the nozzle 34 would have a lower velocity and that there would be a lower propelling force provided by the propellant. Experimental results have indicated that this results in the coarser particle size.

However, it has to be recognized that while the above hypothesis can be proposed with reasonable justification, there are likely other phenomena involved which the applicants are either not aware of or have not fully evaluated. For example, with the propellant being disbursed in (and presumably dissolved in) the texture composition, it can be surmised that this propellant continues to go out of solution or dispersion into its gaseous form and expand to provide the propellant force, and this continues as the quantity of texture material continues to be reduced. This may also have a desirable effect on the formation of the particles and of the particle size, relative to consistency.

Nevertheless, regardless of the accuracy or correctness of the above explanations, it has been found that with the present invention, the spray pattern (and more particularly the particle size of the spray pattern) can be achieved with greater consistency and within relatively greater limits of

particle size, than the prior art devices known to the applicants. Further, the consistency of the spray pattern can be maintained for the discharge of a large proportion of spray texture material from the apparatus 10.

It is to be recognized, of course, that various relative dimensions could be changed without departing from the basic teachings of the present invention. For example, it has been found that with spray texture material of a character which are acceptable in present day use, that a range of tube inside diameters of approximately one half of a tenth of an inch to one and one half tenth of an inch would give a reasonable range of texture spray patterns. However, it can be surmised that tube diameters outside of this range (e.g. one quarter of a tenth of an inch to possibly as high as one quarter of an inch would also provide acceptable texture spray patterns, depending upon a variety of circumstances, such as the viscosity and other characteristics of the spray texture material itself, the discharge pressure, the volumetric rate at which the spray texture material is delivered to the tube 24, and other factors.

Referring now to FIGS. 19 and 20, depicted therein at 120 is another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention. The spray texturing apparatus 120 basically comprises an aerosol container 122, a valve assembly 124 mounted on the container 122, and an outlet member 126 attached to the valve assembly 124.

The outlet member 126 has first, second, and third outlet orifices 128a, 128b, and 128c formed therein. As shown in FIG. 19, these outlet orifices 128a, 128b, and 128c have of different diameters. Further, the outlet member 126 is so attached to the valve assembly 124 that each of the orifices 128a, 128b, and 128c aligned with a nozzle passageway 130 of the valve assembly 124 through which the texture material is dispensed or discharged. Aligning the orifices 128a, 128b, and 128c as just-described effectively extends the length of the nozzle passageway 130 in a manner that allows the operator to vary the cross-sectional area of a discharge opening 131 through which the texture material is discharged.

To operate the spray texturing apparatus 120, the valve assembly 124 is operated to allow the spray material within the container 122 to pass through the nozzle passageway 130. The texture material thus exits the spray texturing apparatus 120 through whichever of the outlet orifices 128a, 128b, or 128c is aligned with the nozzle passageway 130.

As shown in FIG. 20, the nozzle passageway 130 has a diameter of d_n . Similar to the dispensing tubes 24a, 24b, and 24c described above, the outlet orifices 128a, 128b, and 128c of different diameters d_a , d_b , and d_c result in different spray texture patterns 20 being applied to the wallboard 12. One of the outlet orifices 128a, 128b, and 128c is selected according to the type of texture pattern desired and arranged to form a portion of the nozzle passageway 130, thereby varying the effective cross-sectional area of the discharge opening 131. The outlet orifice 128a is of the smallest diameter and results in a spray pattern having the small particles 44a as shown in FIG. 4. The outlet orifice 128b is of medium diameter and results in a spray pattern having the somewhat larger particles 44b shown in FIG. 5. The outlet orifice 128c is of the largest diameter, which results in a spray pattern having the large particles 44c shown in FIG. 6.

The spray texturing apparatus 120 obtains the same basic result as the apparatus 10 described above and the prior art assembly shown in FIGS. 27 and 28; however, as will be apparent from the following discussion, the apparatus 120

allows a reduction in the number of parts employed to achieve this result and substantially eliminates the possibility that individual parts will be lost by the end user. Also, the apparatus 120 is completely assembled at the factory and thus alleviates the potential for the operator to be sprayed with texture material during assembly.

Referring again to FIG. 20, the operation of the spray texturing apparatus 120 will now be described in further detail. The container 122 basically comprises a generally cylindrical base 132 and a cap 134. The base 132 and cap 134 are conventional and need not be described herein in detail.

The valve assembly 124 basically comprises: (a) the outlet member 128 described above; (b) an actuator member 136 having a valve stem 138; (c) a valve seat 140; (d) a valve housing 142; (e) a valve member 144; (f) a valve spring 146; and (g) a collection tube 148 that extends into the spray material within the container 122. Essentially, the valve assembly 124 creates a path that allows the pressure within the container 122 to cause the texture material to flow through the nozzle passageway 130.

The valve assembly 124 is constructed and operates basically as follows. The valve seat 140 and valve housing 142 mate with and are held by the container cap 134 near a valve hole 150 in the cap 134. The valve member 144 and valve spring 146 are mounted within the valve housing 142 such that the valve spring 146 urges the valve member 144 towards the valve seat 140. The valve stem 138 extends through the valve hole 150 and is attached to the valve member 144; pressing the actuator member 136 towards the container 122 into an open position forces the valve member 144 away from the valve seat 140 against the urging of the valve spring 146.

When the valve member 144 is forced away from the valve seat 140, an exit passageway 152 for the spray material is created. This exit passageway 152 allows the spray material to exit the apparatus 120 by passing: through the collection tube 136; through the center of the valve housing 142; around the valve member 144; through a slot 154 formed in the valve stem 138; through a vertical passageway 156 formed in the actuator member 136; through the nozzle passageway 130 described above; and through the one of the outlet orifices 128a, 128b, or 128c aligned with the nozzle passageway 130. At this point, the spray material forms the spray 18 as described above.

The exemplary outlet member 126 basically comprises a disc portion 158 and a cylindrical portion 160. The first, second, and third outlet orifices 128a, 128b, and 128c are formed in the disc portion 158. Center axes A, B, and C of the outlet orifices 128a, 128b, and 128c are equidistant from a center axis D of the disc portion 158; the distances between the center axes A, B, and C of these outlet orifices 128a, 128b, and 128c and the center axis D of the disc portion 158 are represented by the reference character X in FIG. 20.

The cylindrical portion 160 of the outlet member 126 has a center axis E which is aligned with the center axis D of the disc portion 158. Additionally, an outlet portion 162 of the actuator member 126 through which the nozzle passageway 130 extends has a generally cylindrical outer surface 164. A center axis F of the actuator member outer surface 164 is aligned with the center axes D and E described above.

Also, a center axis G of the nozzle passageway 130 is arranged parallel to the center axis F of the actuator member outer surface 164. The center axis G of this nozzle passageway 130 is spaced away from actuator member center axis F the same distance X that exists between the center axes A,

B, and C of the nozzle exit orifices and the center axis D of the disc portion 158.

Finally, an inner surface 166 of the outlet member cylindrical portion 160 is cylindrical and has substantially the same diameter d , taking into account tolerances, as the cylindrical outer surface 164 of the outlet portion 162 of the actuator member 136. An outlet surface 168 of the outlet portion 162 is disc-shaped and has substantially the same diameter d as the outlet member inner surface 166 and the actuator member outer surface 164.

Accordingly, as shown in FIG. 20, the outlet member 126 is attached to the actuator member 136 by placing the cylindrical portion 160 of the outlet member 126 over the outlet portion 162 of the actuator member 136 such that the actuator member outlet surface 168 is adjacent to an inner surface 170 on the disc portion 158 of the outlet member 126.

When the outlet member 126 is so mounted on the actuator member 136, an annular projection 172 formed on the inner surface 166 of the outlet member cylindrical portion 160 engages an annular indentation 174 formed in the outer surface 164 of the actuator member outlet portion 162. The projection 172 and indentation 174 are arranged parallel to the actuator member outlet surface 168 and thus allow rotation of the outlet member 126 relative to the actuator member 136. Further, the engagement of the projection 172 with the indentation 174 prevents inadvertent removal of the outlet member 126 from the actuator member 136; however, both the projection 172 and indentation 174 are rounded to allow the outlet member 126 to be attached to and detached from the actuator member 136 when desired. The outlet member cylindrical portion 160, the projection 172, and indentation 174 thus form an attachment means 176 for rotatably attaching the outlet member 126 to the actuator member 136.

As shown in FIG. 20, when the outlet member 126 is attached to the actuator member 136, the center axes D, E, and F described above are aligned. Further, the outlet orifice center axes A, B, and C are parallel to the nozzle passageway center axis G. Accordingly, any one of these outlet orifice center axes A, B, and C can be aligned with the nozzle passageway center axis G by rotation of the outlet member 26 about the axes D, E, and F relative to the actuator member 136. In FIG. 20, the center axis A of the first outlet orifice 128a is shown aligned with the nozzle passageway center axis G.

FIG. 20 also shows that an intermediate surface 178 is formed at one end of the first exit orifice 128a. This intermediate surface 176 brings the diameter of the exit passageway 152 gradually down from a diameter d_o of the dispensing passageway 130 to the diameter d_a of the first exit orifice 128a. A similar intermediate surface exists at one end of the second exit orifice 128b. An intermediate surface is not required for the third exit orifice 128c as, in the exemplary apparatus 120, the diameter d_c of the third exit orifice is the same as that of the diameter d_o of the nozzle passageway 130.

Referring now to FIGS. 21 and 22, depicted therein at 220 is yet another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention. The spray texturing apparatus 220 operates in the same basic manner as the apparatus 120 just-described; accordingly, the apparatus 220 will be described herein only to the extent that it differs from the apparatus 120. The characters employed in reference to the apparatus 220 will be the same as those employed in

reference to the apparatus 120 plus 100; where any reference characters are skipped in the following discussion, the elements referred to by those skipped reference characters are exactly the same in the apparatus 220 as the elements corresponding thereto in the apparatus 120.

The spray texturing apparatus 220 basically comprises an aerosol container 222, a valve assembly 224 mounted on the container 222, and an outlet member 226 attached to the valve assembly 224. The valve assembly 224 further comprises an actuator member 236. The primary difference between the apparatus 120 and the apparatus 220 is in the construction of the outlet member 226 and the actuator member 236 and the manner in which these members 226 and 236 inter-operate.

In particular, the outlet member 226 simply comprises a disc portion 258. An attachment means 276 for attaching the outlet member 226 to the actuator member 236 basically comprises an indentation or hole 272 formed in the outlet member disc portion 258 and a projection 274 formed on an outlet surface 268 formed on the actuator member 236. The hole 272 and projection 274 lie along a center axis D of the disc portion 258 and a center axis F extending through the actuator member 236. The interaction of the hole 272 and the projection 274 allow the outlet member 226 to be rotated about the axes D and F. A rounded end 280 of the projection 274 prevents inadvertent removal of the outlet member 226 from the actuator member 236.

Accordingly, it should be clear from the foregoing discussion and FIGS. 21 and 22 that the attachment means 276 accomplishes the same basic function as the attachment means 176 described above and thus that the apparatus 220 operates in the same basic manner as the apparatus 120 described above.

Referring now to FIGS. 23 and 24, depicted therein at 320 is yet another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention. The spray texturing apparatus 320 operates in the same basic manner as the apparatus 120 described above; accordingly, the apparatus 320 will be described herein only to the extent that it differs from the apparatus 120. The characters employed in reference to the apparatus 320 will be the same as those employed in reference to the apparatus 120 plus 200; where any reference characters are skipped in the following discussion, the elements referred to by those skipped reference characters are exactly the same in the apparatus 320 as the elements corresponding thereto in the apparatus 120.

The spray texturing apparatus 320 basically comprises an aerosol container 322, a valve assembly 324 mounted on the container 322, and an outlet member 326 attached to the valve assembly 324. The valve assembly 324 further comprises an actuator member 336. The primary difference between the apparatus 120 and the apparatus 320 is in the construction of the outlet member 326 and the actuator member 336 and the manner in which these members 326 and 336 inter-operate.

In particular, the outlet member 326 simply comprises a disc portion 358. An attachment means 376 for attaching the outlet member 326 to the actuator member 336 basically an annular ring 374 having a center axis E fastened to the actuator member 236. An annular projection 380 extends inwardly from the ring 374. The diameter of the disc portion 358 is substantially the same as that of the ring 374, taking into account tolerances, and slightly larger than that of the projection 380.

The outlet member 326 is attached to the actuator member 336 by placing the outlet member 326 within the ring 374

and attaching the ring 374 onto the actuator member 336 with: (a) the outlet member 326 between the annular projection 380 and an outlet surface 368 of the actuator member 336; and (b) a center axis D of the disc member 358 aligned with the axis E of the ring 374 and a center axis F of the actuator member 336. The outlet member 326 can rotate within the ring 374 about the axes D, E, and F, and the annular projection 380 prevents inadvertent removal of the outlet member 326 from the actuator member 336. A handle 382 is provided on the outlet member 326 to facilitate rotation outlet member 326.

The attachment means 376 accomplishes the same basic function as the attachment means 176 described above. The apparatus 320 thus operates in all other respects in the same basic manner as the apparatus 120 described above.

Referring now to FIGS. 25 and 26, depicted therein at 420 is yet another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention. The spray texturing apparatus 420 operates in the same basic manner as the apparatus 120 described above; accordingly, the apparatus 420 will be described herein only to the extent that it differs from the apparatus 120. The characters employed in reference to the apparatus 420 will be the same as those employed in reference to the apparatus 120 plus 300; where any reference characters are skipped in the following discussion, the elements referred to by those skipped reference characters are exactly the same in the apparatus 420 as the elements corresponding thereto in the apparatus 120.

The spray texturing apparatus 420 basically comprises an aerosol container 422, a valve assembly 424 mounted on the container 422, and an outlet member 426 attached to the valve assembly 424. The valve assembly 424 further comprises an actuator member 436. The primary difference between the apparatus 120 and the apparatus 420 is in the construction of the outlet member 426 and the actuator member 436 and the manner in which these members 426 and 436 inter-operate.

In particular, the outlet member 426 comprises a disc portion 458 having a lower surface 466 and a cylindrical portion 460 having an inner surface 470. In the exemplary apparatus 420, the actuator member 436 has an upper surface 464 and a cylindrical outer surface 468. When the valve assembly 424 is assembled, a center axis D of the disc portion 458, a center axis E of the cylindrical portion 460, and a vertical center axis F of the stem portion 436 are aligned.

An attachment means 476 for attaching the outlet member 426 to the actuator member 436 basically comprises an annular ring 472 formed on the outlet member cylindrical portion 460 and a notch or indentation 474 formed around the cylindrical outer surface 468 of the actuator member 436. This attachment means 476 allows the outlet member 426 to rotate relative to the actuator member 436 about the axes D, E, and F but prevents inadvertent removal of the outlet member 426 from the actuator member 436.

With this configuration, the first, second, and third outlet orifices 428a, 428b, and 428c are formed in the cylindrical portion 460 of the outlet member 426. These orifices 428a, 428b, and 428c are formed with their center axes A, B, and C orthogonal to, arranged at a given vertical point H along, and radially extending outwardly from the vertical center axis F of the stem portion 436. A center axis G of a nozzle passageway 430 formed in the actuator member 436 also is orthogonal to, radially extends from, and intersects at the given point H the vertical center axis F of the stem portion 436.

To facilitate rotation of the outlet member 426 relative to the actuator member 436, a peripheral flange 480 is formed at the bottom of the actuator member 436. The user can grasp this flange 480 to hold the actuator member 436 in place as the outlet member 426 is being rotated about its axis D.

Thus, rotation of the outlet member 426 relative to the actuator member 436 about the axes D, E, and F allows any one of these orifices 428a, 428b, and 428c to be aligned with a center axis G of a nozzle passageway 430 formed in the actuator member 436. The first outlet orifice 428a is shown aligned with the nozzle passageway 430 in FIG. 26.

The attachment means 476 thus also accomplishes the same basic function as the attachment means 176 described above. Accordingly, the apparatus 420 operates in all other respects in the same basic manner as the apparatus 120 described above.

Referring now to FIGS. 27, 28, 29, and 30, depicted therein at 520 is another exemplary spray texturing apparatus constructed in accordance with, and embodying, the principles of the present invention. The spray texturing apparatus 520 operates in the same basic manner as the apparatus 120 described above; accordingly, the apparatus 520 will be described herein only to the extent that it differs from the apparatus 120. The characters employed in reference to the apparatus 520 will be the same as those employed in reference to the apparatus 120 plus 400; where any reference characters are skipped in the following discussion, the elements referred to by those skipped reference characters are exactly the same in the apparatus 520 as the elements corresponding thereto in the apparatus 120.

The spray texturing apparatus 520 basically comprises an aerosol container 522, a valve assembly 524 mounted on the container 522, and an outlet member 526 attached to the valve assembly 524. The valve assembly 524 further comprises an actuator member 536. The primary difference between the apparatus 120 and the apparatus 520 is in the construction of the outlet member 526 and the actuator member 536 and the manner in which these members 526 and 536 inter-operate.

In particular, in the apparatus 520 a nozzle passageway 530 formed in the actuator member 536 terminates at the top rather than the side of the actuator member 536. The outlet member 526 comprises a disc member 558 attached to an outlet surface 568 on the upper end of the actuator member 536. A hole 572 formed in the disc member 558 and a projection 574 formed on the outlet surface 568 comprise an attachment means 576 for attaching the outlet member 526 onto the actuator member 536.

The attachment means 576 allows the outlet member 526 to be rotated about a center axis D thereof relative to the actuator member 536 such that any one of the center axes A, B, or C of outlet orifices 528a, 528b, and 528c can be aligned with a center axis G of the nozzle passageway 530.

Finger engaging wings 580 and 582 are formed on the actuator member 536 to allow the user to depress the actuator member 536 and spray the texture material within the container without getting texture material on the fingers.

The nozzle passageway identified by the reference character 530a in FIG. 28 comprises a dog-leg portion 584 that allows a center axis G of the nozzle passageway 530a to be offset from a vertical center axis F of the stem portion 536 and the center axis D of the outlet member 526. In FIG. 30, the nozzle passageway 530b is straight and the center axis D of the outlet member 526 is offset from the vertical center axis F of the stem portion 536. In this case, the disc member

558b forming the outlet member **526** in FIGS. **29** and **30** has a larger diameter than does the disc member **558a** forming the outlet member **526** in FIGS. **27** and **28**.

It is to be recognized that various modifications can be made without departing from the basic teaching of the present invention.

What is claimed is:

1. An apparatus for coating a wall or ceiling to match a pre-existing wall or ceiling texture pattern, comprising:

10 a container means for containing texture material and propellant material, where a first portion of the propellant material is in a liquid phase and is mixed with the texture material to form a liquid mixture and a second portion of the propellant material is in a gaseous phase, where the gaseous phase propellant material pressurizes the liquid mixture;

a valve assembly mounted on the container means, the valve assembly being operable between a closed position and an open position;

an actuator member mounted on the valve assembly;

an outlet member rotatably mounted on the actuator member, the outlet member having a plurality of outlet orifices corresponding to one of a plurality of patterns of texture material; wherein

the valve assembly and actuator member define a portion of an exit passageway;

the outlet member is rotated relative to the actuator member such that a selected one of the plurality of outlet orifices another portion of the exit passageway; and

the actuator member is displaced to cause the valve assembly to move from the closed position in which the pressurized liquid mixture is prevented from passing out of the container means through the exit passageway into an open position in which the pressurized liquid mixture is allowed to flow out of the container means through the exit passageway and onto the wall or ceiling to be coated where the texture material hardens to form a coating that matches the pre-existing wall or ceiling texture pattern.

2. An apparatus as recited in claim **1**, in which:

the actuator member has an outlet portion; and the outlet member has a disc portion and an attachment portion; wherein

the outlet orifices are formed in the disc portion of the outlet member;

the exit passageway extends through the outlet portion the actuator member; and

the attachment portion engages the outlet portion such that any one of the outlet orifices may be aligned with the exit passageway.

3. An apparatus as recited in claim **2**, in which:

the outlet portion has a first axis;

the disc portion of the outlet member defines a second axis;

the exit passageway defines a third axis, the third axis being spaced from the first axis;

the outlet orifices each define an outlet axis, where the outlet axes are spaced from the second axis;

the attachment portion engages the outlet portion such that the first and second axes are aligned.

4. An apparatus as recited in claim **3**, in which the third axis is spaced a first distance from the first axis, and the outlet axes are all spaced the first distance from the second axis.

5. An apparatus as recited in claim **3**, in which the outlet portion has a cylindrical outer surface and the engaging portion is a cylinder that mates with the cylindrical outer surface of the outlet portion.

6. An apparatus as recited in claim **3**, in which:

the outlet portion comprises a projection; and

the engaging portion comprises an indentation that engages the projection to mount the outlet member onto the actuator member.

7. An apparatus as recited in claim **3**, in which:

the outlet portion comprises a projection; and

the engaging portion comprises an hole that engages the projection to mount the outlet member onto the actuator member.

8. An apparatus as recited in claim **3**, in which:

the outlet portion comprises an annular ring having an inwardly extending annular projection; and

the actuator member member is disc shaped and is held against the outlet portion by the annular projection.

9. An apparatus as recited in claim **3**, in which:

the outlet portion has a substantially cylindrical outer surface and the exit passageway extends through this outer surface; and

the engaging portion is substantially cylindrical; wherein the outlet orifices are formed in the engaging portion.

10. An apparatus as recited in claim **9**, in which a flange is formed on the actuator member to facilitate movement of the outlet member relative to the actuator member.

11. An apparatus as recited in claim **1**, in which the exit passageway is defined in part by first and second passageway portions formed in the actuator member, wherein:

the first passageway portion is in communication with the valve assembly;

the second passageway portion terminates in an outlet surface; and

the outlet member is arranged adjacent to the outlet surface when mounted on the actuator member.

12. An apparatus as recited in claim **1**, in which the exit passageway is arranged such that the portion thereof defined by the outlet member is arranged to dispense texture material along an axis substantially parallel to a center axis of the container means.

13. An apparatus as recited in claim **12**, in which:

the actuator member has a substantially planar upper surface; and

the outlet member is a plate attached to the upper surface of the actuator member.

14. A method of coating a wall ceiling to match a pre-existing wall or ceiling texture pattern, comprising the steps of:

providing a container;

introducing texture material and propellant material into the container, where a first portion of the propellant material is in a liquid phase and is mixed with the texture material to form a liquid mixture and a second portion of the propellant material is in a gaseous phase, where the gaseous phase propellant material pressurizes the liquid mixture;

mounting a valve assembly onto the container means, the valve assembly being operable between a closed configuration and an open configuration;

mounting an actuator member onto the valve assembly; providing an outlet member having a plurality of outlet orifices formed therein, where each of the plurality of

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outlet orifices corresponds to one of a plurality of patterns of texture material;
forming an exit passageway a portion of which passes through the valve assembly and the actuator member;
rotating the outlet member relative to the actuator member such that a selected one of the plurality of outlet orifices forms another portion of the exit passageway; and
displacing the actuator member to cause the valve assembly to move from the closed configuration in which the pressurized liquid mixture is prevented from passing

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out of the container means through the exit passageway and into the open position in which the pressurized liquid mixture is allowed to flow out of the container means through the exit passageway and onto the wall or ceiling to be coated; and
allowing the texture material to harden in a pattern that matches the pre-existing wall or ceiling texture pattern.

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